

WHAT IS CLAIMED IS:

5 1. A method for delivering a substance into skin comprising delivering the substance into an intradermal space within the skin through a small gauge needle inserted into the intradermal space, wherein an outlet of the needle is inserted at a depth within the skin such that leakage of the substance to the surface of the skin is substantially prevented.

10 2. The method of Claim 1 wherein the needle is selected from the group consisting of microneedles, catheter needles, and injection needles.

15 3. The method of Claim 1 wherein a single needle is inserted.

4. The method of Claim 1 wherein multiple needles are inserted.

20 5. The method of Claim 1 wherein the substance is a liquid delivered by pressure directly on the liquid.

6. The method of Claim 1 wherein a hormone is delivered.

25 7. The method of Claim 6 wherein the hormone is selected from the group consisting of insulin and PTH.

8. The method of Claim 1 wherein the substance is infused.

25 9. The method of Claim 1 wherein the substance is injected as a bolus.

30 10. The method of Claim 1 wherein the needle is about 300 μm to 2 mm long.

11. The method of Claim 10 wherein the needle is about 500 μm to 1 mm long.

35 12. The method of Claim 1 wherein the outlet is at a depth of about 250 μm to 2 mm when the needle is inserted.

13. The method of Claim 12 wherein the outlet is at a depth of about 750 μm to 1.5 mm when the needle is inserted.

14. The method of Claim 12 wherein the outlet has an exposed height of about 0 to 1 mm.

15. The method of Claim 14 wherein the outlet has an exposed height of about 0 to 300 μm

5 16. The method of Claim 1 wherein delivery rate or volume delivered is controlled by spacing of multiple needles, needle diameter or number of needles.

10 17. A needle for intradermal delivery of a substance into skin comprising means for limiting penetration of the needle into the skin and an outlet positioned such that when the needle is inserted into the skin to a depth determined by the penetration limiting means, leakage of the substance to the surface of the skin is substantially prevented.

15 18. The needle of Claim 17 wherein the outlet is at a depth of about 500 μm to 2 mm when the needle is inserted into the skin.

20 19. The method of Claim 18 wherein the outlet is at a depth of about 750 μm to 1.5 mm when the needle is inserted into the skin.

25 20. The needle of Claim 17 which is about 300 μm to 2 mm long.

21. The needle of Claim 20 which is about 500 μm to 1 mm long.

22. The needle of Claim 17 which is contained in a device comprising a reservoir in fluid communication with the needle.

25 23. The needle of Claim 22 which is contained in a device further comprising pressure-generating means for delivering the substance through the needle.

30 24. The needle of Claim 23 wherein the pressure-generating means provides variable control of substance delivery rate.

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